PATENT SPECIFICATION

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PROVISIONAL SPECIFICATION

Improvements relating to Piston Packings

We, WESTINGHOUSE BRAKE & SIGNAL COMPANY LIMITED, a Company incorporated under the Laws of Great Britain, and ALOYSIUS GRAHAM BRACKENBURY, a Subject, of the King of Great Britain, both of 82, York Way, King's Cross, London, N.1, England, do hereby declare the nature of this invention to be as follows:—

This invention relates to piston packings of the kind generally known in the art as slipping bands.

Piston packings of this kind usually comprise a cylindrical strip of resilient material attached to the piston in such a way that it acts as a seal between the piston and the wall of the cylinder in which the piston reciprocates, and is carried up and down the cylinder by the piston.

Slipping bands are widely used in the operating cylinders of fluid pressure braking apparatus and, when so used in particular, it is important that there should be little or no leakage of fluid under pressure from one side of the piston to the other. To ensure an efficient seal, and so to minimise such leakage, it is necessary that the slipping band be held against the cylinder wall by a certain amount of pressure but, as will be readily realised, the higher the pressure used the more will be the energy lost in overcoming friction between the slipping band and the cylinder wall.

Several methods have been proposed for maintaining a suitable pressure between the slipping band and the cylinder wall, among which is to provide a slipping band of a thickness greater than the clearance between the piston and the cylinder wall so that the band is compressed between the two. This method suffers from the disadvantage that, in order to allow for wear of the slipping band and unavoidable inaccuracies in the thickness of the material of which it is made, the compression of the band has to be so great that the frictional loss is excessive.

Another method which has been employed is to insert a metal expander, in the form of a split ring, between the piston and the inside of the skirt of the band. The disadvantage of this method is that, without using an expander of specially designed cross-section, it is impossible to obtain an even pressure at all points around the circumference of the band. This means that, in order to obtain the minimum pressure required at all points, that at the majority of points around the circumference must be greater than necessary, resulting in frictional loss as the piston moves in the cylinder. Furthermore, with large cylinders, such as vacuum brake cylinders of a diameter of 30 inches, such metal expander rings assume uneconomical dimensions. Another disadvantage of this method is that the slipping band tends to wear rapidly at the points of high pressure, with consequent leakage at these points.

Yet another proposed method is to arrange a number of radially disposed springs around the circumference of the piston, bearing upon the skirt of the slipping band through a comparatively thin metal ring, which may be articulated. This method, although giving an approximately even pressure around all parts of the circumference, has the disadvantage of being somewhat complicated in assembly and maintenance and a broken spring may well cause severe damage.

It is the object of this invention substantially to overcome the above disadvantages and, according to the invention, a ring of rubber or similar compressible material is contained between the piston and the inside of the skirt of the slipping band in such a manner that when the piston is inserted into the cylinder the ring is slightly compressed

and thus presses the slipping band against the wall of the cylinder with a substantially even pressure all round the circumference.

In one embodiment of the invention, as applied to a vacuum brake piston, the slipping band is made of L-shaped cross section, one leg of the L being clamped to the top of the piston by means of a suitable clamping ring secured by bolts. The skirt or other leg of the L, extends downwardly towards the base of the piston. Around the top of the piston and covered by the skirt of the slipping band, a semi-circular groove is provided in which is housed a rubber ring of circular cross-section and such dimensions that, when the piston is inserted into the cylinder, the ring is slightly compressed and holds the skirt of the slipping band firmly against the cylinder wall with a pressure which ensures an efficient seal between the piston and the cylinder.

Dated this 6th day of July, 1948.

H. A. COPE,
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COMPLETE SPECIFICATION

Improvements relating to Piston Packings

We, WESTINGHOUSE BRAKE & SIGNAL COMPANY LIMITED, a Company incorporated under the Laws of Great Britain, and ALOYSIUS GRAHAM BRACKENBURY, a Subject of the King of Great Britain, both of 82, York Way, King's Cross, London, N.1, England, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to piston packings of the kind which comprises a substantially cylindrical strip of flexible material carried by the piston and extending axially between the cylinder wall and the outer periphery of the piston so as to form a seal therebetween.

Such piston packings are widely used in the operating cylinders of fluid pressure braking apparatus and, when so used in particular, it is important that there should be little or no leakage of fluid under pressure from one side of the piston to the other. To ensure an efficient seal, and so to minimise such leakage, it is necessary that the packing be held against the cylinder wall by a certain amount of pressure but, as will be readily realised, the higher the pressure used the more will be the energy lost in overcoming friction between the packing and the cylinder wall.

Several methods have been proposed for maintaining a suitable pressure between the packing and the cylinder wall, among which is to provide a packing of a thickness greater than the clearance between the piston and the cylinder wall so that it is compressed between the two. This method suffers from the disadvantage that, in order to allow for wear of the packing and unavoidable inaccuracies in the thickness of the material of which it is made, the compression of the packing has to be so great that the frictional loss is excessive.

Another method which has been employed is to insert a metal expander, in the form of a split ring, between the piston and the inside of the skirt of the packing. The disadvantage of this method is that without using an expander of specially designed cross-section, it is impossible to obtain an even pressure at all points around the circumference of the packing. This means that, in order to obtain the minimum pressure required at all points, that at the majority of points around the circumference must be greater than necessary, resulting in frictional loss as the piston moves in the cylinder. Furthermore, with large cylinders, such as vacuum brake cylinders of a diameter of 30 inches, such metal expander rings assume uneconomical dimensions. Another disadvantage of this method is that the packing tends to wear rapidly at the points of high pressure, with consequent leakage at these points.

Yet another proposed method is to arrange a number of radially disposed springs around the circumference of the piston, bearing upon the skirt of the packing through a comparatively thin metal ring, which may be articulated. This method, although giving an approximately even pressure around all parts of the circumference, has the disadvantage of being somewhat complicated in assembly and maintenance and a broken spring may well cause severe damage.

It has also been proposed to provide the periphery of a piston with a pair of rings of suitable metal of flanged form and adapted to receive between the flange and

the body of the piston a ring of rubber or equivalent material. The backs or outer faces of the radially extending portions of the metal rings were inclined, so that an annular space was left between them. The flanges of the rings were tapered and terminated in relatively sharp edges, opposed to the direction in which the fluid pressure was to act. A pressure member, or nut, screwed onto a threaded part of the piston was provided and by screwing this pressure member up pressure was applied axially to the rubber rings, the consequent radial expansion of the tapered flanges of the metal rings forcing them tightly outwards against the bore of the cylinder in which the piston worked.

It is the object of this invention substantially to overcome the above disadvantages and, according to the invention, a ring of rubber or similar resiliently compressible material is located between the outer wall of the piston and the skirt of the packing in such a manner that when the piston is inserted into its cylinder the ring is slightly compressed and thus presses the packing against the wall of the cylinder with a substantially even pressure all round the circumference.

Preferably the ring is of circular cross-section, but rings of other curvilinear or non-curvilinear cross-sections may be employed.

The invention is illustrated by way of example in the accompanying drawing which represents a cross sectional view of a portion of a piston and cylinder assembly of the kind widely used in vacuum brake systems for railway vehicles.

Referring to the drawing, a piston 1 is arranged to reciprocate within a cylinder 2. A packing 3 of substantially **L** shaped cross-section is provided, one leg of the **L** being clamped to the top of the piston by means of a clamping ring 4 secured thereto by a number of **T** headed bolts 5 provided with nuts 6. The skirt or other leg of the **L** extends downwardly, as viewed in the drawing, towards the base of the piston, between the piston and the cylinder wall. The top of the piston is provided with an annular recess 7 into which a cooperating projecting rib 8, formed on the packing, extends to secure the packing from radial movement.

Around the top of the piston 1, and covered by the downwardly extending leg of the packing 3, is provided an annular groove 9 in which is located a rubber ring 10 of circular cross section and of such dimensions that, when the piston is inserted into the cylinder, as shown, the ring is slightly compressed and holds the packing firmly against the cylinder wall with a pressure which ensures an efficient seal between the piston and the cylinder. This pressure, unlike that produced by known expanders, is evenly distributed all round the circumference.

It will be appreciated that the invention is not limited to the use of rubber rings of circular cross section and other cross sectional shapes and resiliently compressible materials, may evidently be employed.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. A piston packing of the kind described, in which a ring of rubber or similar resiliently compressible material is located between the outer wall of the piston and the skirt of the packing in such a manner that when the piston is inserted into its cylinder the ring is slightly compressed and thus presses the packing against the wall of the cylinder with substantially even pressure all round the circumference.

2. A piston packing as claimed in Claim 1, in which the ring is located in an annular groove formed in the piston.

3. A piston packing as claimed in Claim 2, in which the ring is curvilinear in cross-section.

4. A piston packing as claimed in Claim 3, in which the ring is circular in cross-section.

5. A piston packing constructed and arranged substantially as described herein and shown in the accompanying drawing.

Dated this 22nd day of June, 1949.

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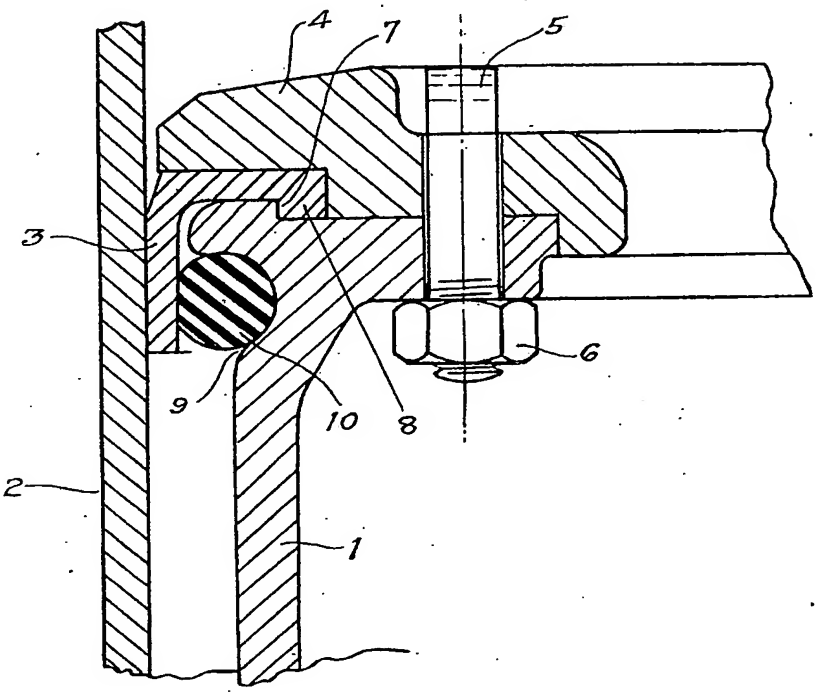

[This Drawing is a reproduction of the Original on a reduced scale.]

H.M.S.O. (Ty. P.)